

SHOCK ABSORBER WITH POSITION SENSOR

FIELD

[0001] The present disclosure relates to a shock absorber and a method to produce it. In particular, the present disclosure relates to a shock absorber comprising first and second damper parts that are movable relative to each other in a dampened manner, wherein a position sensor is provided to detect the relative position of the damper parts.

BACKGROUND

[0002] DE 20 2006 010887 U1 describes, for example, a shock absorber unit having mounting points on a piston rod and a cylinder. A linear relative movement of the mounting points is dampened. A sensor carrier unit is connected to the first mounting point on which a sensor element is arranged. At least one longitudinal guide element is provided on the sensor carrier unit. A cylinder element is connected to the second mounting point, wherein a second sensor element is attached to the cylinder element such that it moves therewith in an axial direction, although it can rotate relative to the cylinder element. The two sensor elements form a sensor for the linear relative movement. The second sensor element has at least one engaging element that interacts with the longitudinal guide element such that when the cylinder element rotates relative to the sensor carrier unit, the radial alignment of the second sensor element relative to the first sensor element is retained.

[0003] DE 35 10 252 A1 describes, for example, a position encoder for a hydraulic working cylinder. A Hall sensor as the positioning encoder is arranged on a housing surrounding the piston rod and is mounted on the piston-rod-side end of the cylinder. The piston rod has a conical cross-section that is filled with nonmagnetic material on the piston rod cross-section and serves as a measuring path for the stroke of the working cylinder.

[0004] DE 10 2008 004 983 A1 discloses, for example, a sensor holder for a piston/cylinder aggregate. A piston rod that can move relative to a cylinder comprises a holding element that executes a synchronous movement with the piston rod and bears a first position measuring apparatus. A second position measuring apparatus is securely held axially on the cylinder by a holder. The cylinder-side holder and the holding element can rotate relative to each other. A magnetic force acting between the holder and the holding element causes a rotating alignment of the two position measuring apparatuses relative to each other.

[0005] DE 10 2004 007 962 A1 describes, for example, a pneumatic spring with a protective sleeve for a rolling bellows. The pneumatic spring comprises a cover that, together with the rolling bellows and a floor part, forms a gas-filled spring chamber. The displacement position of the pneumatic spring is detected by at least one sensor. A seat for a sensor is formed in a pocket in the protective sleeve, wherein the sensor is arranged between the rolling bellows and the protective sleeve.

SUMMARY

[0006] Aspects and advantages of embodiments of the present disclosure will be set forth in part in the following description, or may be learned from the description, or may be learned through practice of the embodiments.

[0007] Example aspects of the present disclosure provide a shock absorber with a position sensor. One example aspect of the present disclosure is directed to a shock absorber comprising a first and a second damper part. The first damper part is movably arranged in a longitudinal direction (L) relative to the second damper part. A position sensor is arranged to detect the relative position of the first damper part to the second damper part. The position sensor comprises an index element on the first damper part and an electric detection circuit for detecting the position of the index element. A flexible sleeve is at least partially arranged around the first and/or the second damper part which is fixed relative to the second damper part. The detection circuit is attached to the flexible sleeve.

[0008] These and other features, aspects and advantages of various embodiments will become better understood with reference to the following description and appended claims. The accompanying drawings, which are incorporated in and constitute a part of this specification, illustrate embodiments of the present disclosure and, together with the description, serve to explain the related principles.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] FIG. 1 shows a perspective view of a shock absorber with a flexible sleeve and a position sensor.

[0010] FIG. 2 shows the shock absorber from FIG. 1 in a side view.

[0011] FIG. 3 shows a plan view of the flexible sleeve and the position sensor of the shock absorber from FIG. 1 and FIG. 2.

[0012] FIG. 4 shows a longitudinal section along line A..A through an attachment point of the sensor in FIG. 3.

[0013] FIG. 5 shows a perspective view of a fastening element of the position sensor from FIGS. 1, 2, 3, and 4.

[0014] FIG. 6 shows a longitudinal section of a second embodiment of a flexible sleeve with the position sensor attached thereto.

[0015] FIG. 7 shows a longitudinal section and an enlarged representation of an attachment point of the sensor from FIG. 6.

[0016] FIG. 8 shows a perspective view of a third embodiment of a flexible sleeve with a position sensor.

[0017] FIG. 9 shows an exploded view of the parts of the flexible sleeve and the position sensor from FIG. 8.

[0018] FIG. 10 shows a perspective view of a section along line B..B in FIG. 8 through the flexible sleeve and the position sensor.

[0019] FIG. 11 shows an enlarged representation of a part of the sectional view through an attachment point in FIG. 10.

DETAILED DESCRIPTION

[0020] Reference now will be made in detail to embodiments, one or more examples of which are illustrated in the drawings. Each example is provided by way of explanation of the embodiments, not limitation of the present disclosure. In fact, it will be apparent to those skilled in the art that various modifications and variations can be made to the embodiments without departing from the scope of the present disclosure. For instance, features illustrated or described as part of one embodiment can be used with another embodiment to yield a still further embodiment. Thus, it is intended that aspects of the present disclosure cover such modifications and variations.